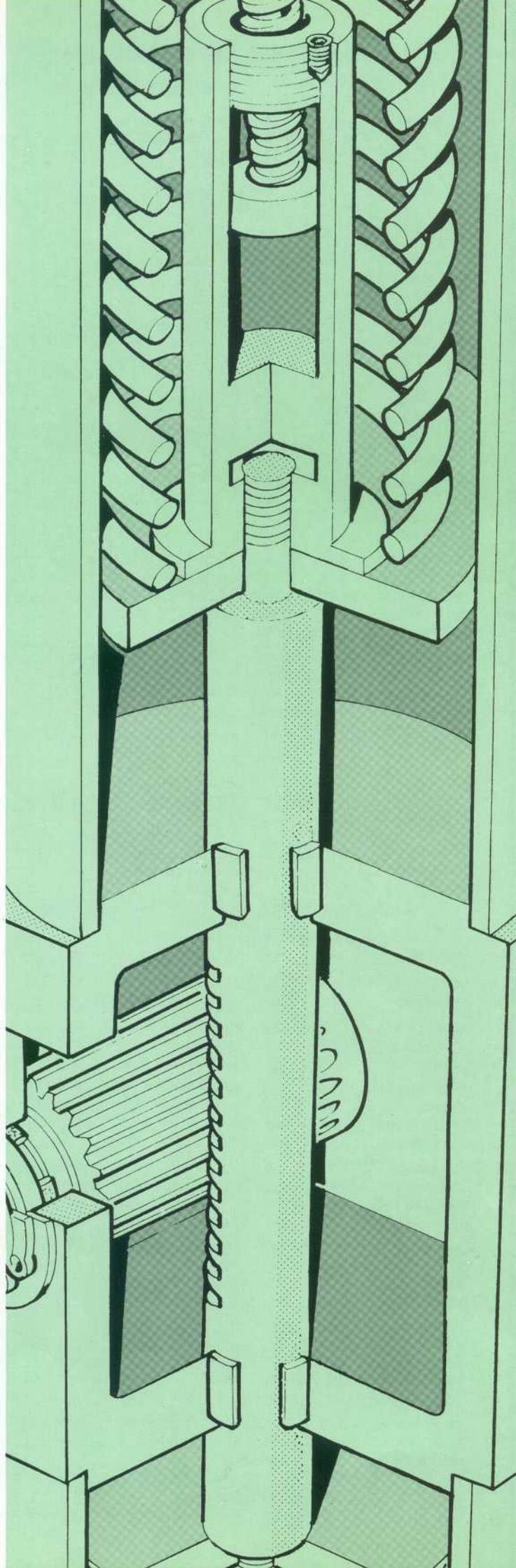


**RACK AND  
PINION  
HYDRAULIC  
ACTUATORS**

**RH-RHM**



**SERVO**

**engineering**

# TECHNICAL PERFORMANCES

## Pressure standard range

Minimum work pressure: 10 bar  
 Maximum work pressure: 150 bar  
 Cylinder test pressure:  
 1,5 max. pressure  
 Actuator test pressure:  
 1,2 max. work pressure

**On request:** available for higher work and max. pressure

## Angular stroke

Standard: 90° ± 5°

**On request:** up to 180°

## Environmental temperature range

Minimum: -20°C

Maximum: +80°C

**On request:** special execution for higher or lower temperature

## Operating medium

Oil, water, gas or any medium compatible with standard material

## Painting

Standard execution has surface protection with:  
 1 lay primer  
 1 lay alkyd

**On request:** available other coating

## Standard execution

Type RH double acting  
 Type RHM single acting  
 Type RHMV single acting with emergency handwheel

## RHM fail standard rotation

For want of other indication the spring fails clockwise (watching the actuator from the top).

**On request:** fails counter clockwise.

## Special execution

Single or double acting actuator for modulating or on-off execution with quick failure position. Equipped with hydraulic and electric device for local and remote control. Emergency stroke time till less 0,2 sec.

**Actuator for greater or special performances available on request.**

**For torque requirements greater than shown or special execution please contact our technical department.**

## DOUBLE ACTING ACTUATOR TYPE RH

### OUTPUT TORQUE

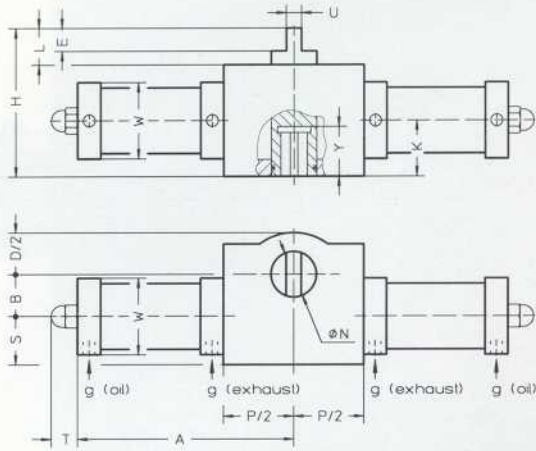
Actuator Type	Minimum oil work pressure					Max work press. bar	Oil volume dm <sup>3</sup>	Weight approx. kg
	50 bar Nm	80 bar Nm	100 bar Nm	120 bar Nm	150 bar Nm			
RH 15/40	110	170	210	260	320	150	0,04	18
RH 30/40	140	230	290	350	430	150	0,05	29
RH 30/45	180	290	370	440	-	120	0,06	34
RH 60/40	210	340	430	520	640	150	0,08	42
RH 60/60	260	420	530	640	-	130	0,09	48
RH 60/80	380	610	760	-	-	100	0,14	54
RH 250/80	950	1530	1910	2290	2860	150	0,4	90
RH 250/90	1210	1930	2420	2900	-	120	0,5	105
RH 250/100	1490	2390	2980	-	-	100	0,6	120
RH 250/110	1800	2890	-	-	-	80	0,7	130
RH 650/80	1530	2450	3060	3680	4600	150	0,6	170
RH 650/100	2390	3830	4790	5750	-	130	0,9	180
RH 650/110	2900	4640	5790	-	-	110	1,1	195
RH 650/125	3740	5990	-	-	-	80	1,4	225
RH 1500/110	3600	5800	7300	8700	10900	150	1,4	380
RH 1500/125	4700	7500	9400	11300	14100	150	1,8	395
RH 1500/160	7700	12300	15400	-	-	100	2,9	420
RH 1500/180	9700	15600	-	-	-	80	3,7	465
RH 3000/125	6600	10500	13100	15700	19700	150	2,5	575
RH 3000/140	8200	13200	16500	19800	24700	150	3,1	600
RH 3000/160	10800	17200	21500	25800	-	140	4,0	625
RH 3000/180	13600	21800	27200	-	-	110	5,1	685
RH 3000/200	16800	26900	-	-	-	90	6,3	745
RH 5000/160	12800	20400	25500	30600	38300	150	4,7	830
RH 5000/180	16200	25800	32300	38800	48500	150	6,0	860
RH 5000/200	19900	31900	39900	47900	-	130	7,4	900
RH 5000/220	24100	38600	48300	-	-	110	8,9	960
RH 5000/250	31200	49800	-	-	-	80	11,5	1055

## SINGLE ACTING ACTUATOR TYPE RHM

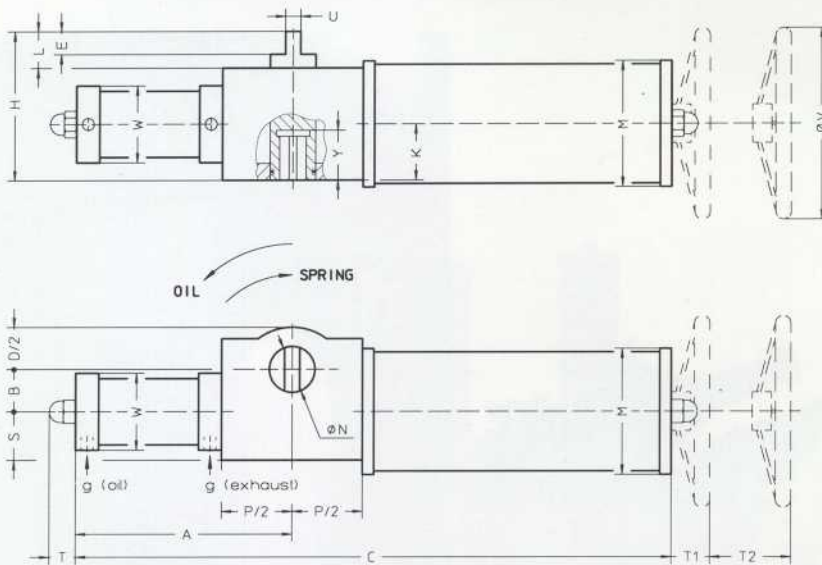
### OUTPUT TORQUE

Actuator Type	Minimum oil work pressure								Max. work press. bar	Stroke oil volume dm <sup>3</sup>	Weight approximate kg
	50 bar		80 bar		100 bar		120 bar				
	Break Nm	End Nm	Break Nm	End Nm	Break Nm	End Nm	Break Nm	End Nm			
RHM15/40	70	40	110	60	140	70	170	90	150	0,04	21
RHM 30/40	100	50	150	80	190	100	230	120	150	0,05	33
RHM 30/45	120	60	190	100	240	120	290	150	120	0,06	39
RHM 60/40	140	70	230	110	290	140	340	170	150	0,08	49
RHM 60/60	180	90	280	140	350	180	420	210	130	0,09	56
RHM 60/80	250	130	410	200	510	250	-	-	100	0,1	63
RHM 250/80	640	320	1020	510	1270	640	1530	760	150	0,4	105
RHM 250/90	810	400	1290	640	1610	810	1930	970	120	0,5	115
RHM 250/100	990	500	1590	800	1990	990	-	-	100	0,6	140
RHM 250/110	1200	600	1930	960	-	-	-	-	80	0,7	155
RHM 650/80	1020	510	1630	820	2040	1020	2450	1230	150	0,6	195
RHM 650/100	1600	800	2550	1280	3190	1600	3830	1920	130	0,9	210
RHM 650/110	1930	970	3090	1550	3860	1930	4640	2320	120	1,1	230
RHM 650/125	2490	1250	3990	2000	-	-	-	-	80	1,4	265
RHM 1500/110	2400	1200	3900	1900	4800	2400	5800	2900	150	1,4	430
RHM 1500/125	3100	1600	5000	2500	6300	3100	7500	3800	150	1,8	455
RHM 1500/160	5100	2600	8200	4100	10200	5100	-	-	100	2,9	490
RHM 1500/180	6500	3200	10400	5200	-	-	-	-	80	3,7	545
RHM 3000/125	4400	2200	7000	3500	8700	4400	10500	5200	150	2,5	695
RHM 3000/160	7200	3600	11500	5700	14300	7200	17200	8600	140	4,0	725
RHM 3000/180	9100	4500	14500	7300	18100	9100	-	-	110	5,1	795
RHM 3000/200	11200	5600	17900	9000	-	-	-	-	90	6,3	865
RHM 3000/220	13600	6800	-	-	-	-	-	-	70	7,6	925
RHM 5000/160	8500	4300	13600	6800	17000	8500	20400	10200	150	5,0	960
RHM 5000/180	10800	5400	17200	8600	21500	10800	25800	12900	150	6,0	995
RHM 5000/200	13300	6600	21300	10600	26600	13300	31900	16000	130	7,0	1050
RHM 5000/220	16100	8000	25700	12900	32200	16100	-	-	110	9,0	1120
RHM 5000/250	20800	10400	33200	16600	-	-	-	-	80	10,0	1230

## ACTUATOR TYPE RH



## ACTUATOR TYPE RHM



### COUPLING FLANGE DIMENSION (mm)

Actuator Type	D	F	G	J	r	t	X	Xma	ISO
RH-RHM 15/..	90	M8	70	-	12,8	6	20	25	F07
RH-RHM 30/..	125	M10	102	-	18,3	8	30	35	F10
RH-RHM 60/..	150	M12	125	-	20,8	10	35	40	F12
RH-RHM 250/..	175	M16	140	-	28,8	14	50	60	F14
RH-RHM 650/..	300	M16	254	200	34,4	18	60	75	F25
RH-RHM 1500/..	350	M20	298	230	50,4	25	90	110	F30
RH-RHM 3000/..	415	M30	356	260	67,4	32	120	150	F35
RH-RHM 5000/..	475	M36	406	300	83,4	36	150	180	F40

X = Shaft connection allowance H8 UNI ISO 286/2  
 r,t = keyway according to UNI 6604-69 or DIN 6885

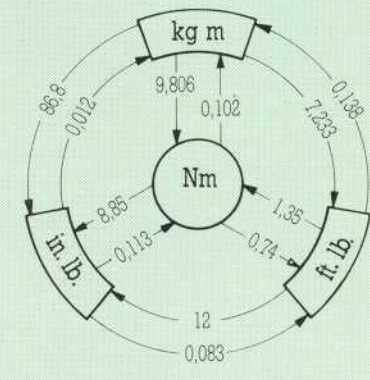
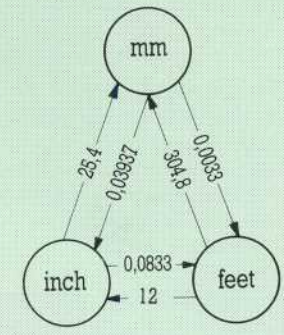
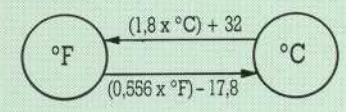
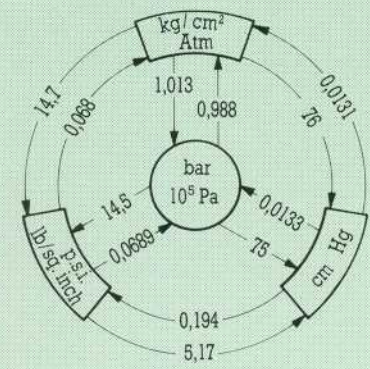
### COUPLING FLANGE (BOTTOM VIEW)



Coupling flange drilling ISO 5211 with male spigot

## ACTUATOR TYPE RH or RHM

Actuator Type	Dimension (mm)																	
	A	B	C	E	H	K	L	M	N	P	S	T	T1	T2	U	V	Y	g
RH-RHM 15/..	130	33	530	20	140	50	40	125	32	150	30	25	85	40	17	250	30	1/8" G
RH-RHM 30/..	230	38	630	20	160	63	35	125	40	190	45	30	85	55	20	250	40	1/4" G
RH-RHM 60/..	300	44	780	20	185	77	30	155	45	230	50	35	100	60	20	350	55	1/4" G
RH-RHM 250/..	340	63	930	-	165	83	10	180	70	310	65	45	-	-	-	-	65	1/2" G
RH-RHM 650/..	450	93	1310	-	195	90	15	310	110	360	180	55	-	-	-	-	90	1/2" G
RH-RHM 1500/..	600	145	1850	-	250	130	25	310	195	500	245	65	-	-	-	-	120	1/2" G
RH-RHM 3000/..	750	190	2350	-	265	130	25	360	245	690	315	70	-	-	-	-	200	1/2" G
RH-RHM 5000/..	850	55	2710	-	335	165	30	360	275	780	380	80	-	-	-	-	250	1/2" G



### CYLINDER FLANGE QUOTE

Actuator Type	Quote W
RH-RHM .../40	90
RH-RHM .../45	90
RH-RHM .../60	100
RH-RHM .../80	130
RH-RHM .../90	140
RH-RHM .../100	175
RH-RHM .../110	195
RH-RHM .../125	210
RH-RHM .../160	260
RH-RHM .../180	280
RH-RHM .../200	300
RH-RHM .../220	320
RH-RHM .../250	350

## Description

The RH or RHM is a quarter turn actuator to operate ball or butterfly valve.

One or two hydraulic cylinders produce the linear thrust that a rack and pinion kinematism transforms in an alternative rotation of the valve shaft. The double acting RH series is realised by two opposed cylinders, completely separated from the central housing in which are located the rack and pinion. In the single acting RHM series the linear thrust of the rack is supplied by one cylinder opposed to a return spring.

The spring cartridge of RHM is equipped with four or more special safety stay-bolts which permits to disassemble the actuator only after the spring preload is completely eliminated.

## Technical peculiarity

All moving parts are completely protected in a water-proof housing. The internal surfaces of the hydraulic cylinders are inside chromium or nickel plated to avoid environmental corrosion.

Chromium plated rack-shaft is driven by sintered self-lubricating bushings. Coupling flange dimensions are ISO standard but allow a great possibility of special connections on request. The spring cartridge can be assembled to ensure the fail position either in clockwise or counter clock-wise rotation.

## Protection and material

RH or RHM is designed and manufactured in order to operate in the heaviest work conditions in every environment, according to the international specification. All actuators have a totally enclosed housing that provides a complete protection for all moving parts, minimising the possibility of internal misalignment, reducing the danger of injury to operating personnel.

## Equipment

All the actuators could be equipped with a manual pump, local oil tank and hydraulic device for emergency action on request. The smallest RHM can be equipped with a declutchable handwheel.

Every execution can be equipped with devices and equipment's for local and remote control as:

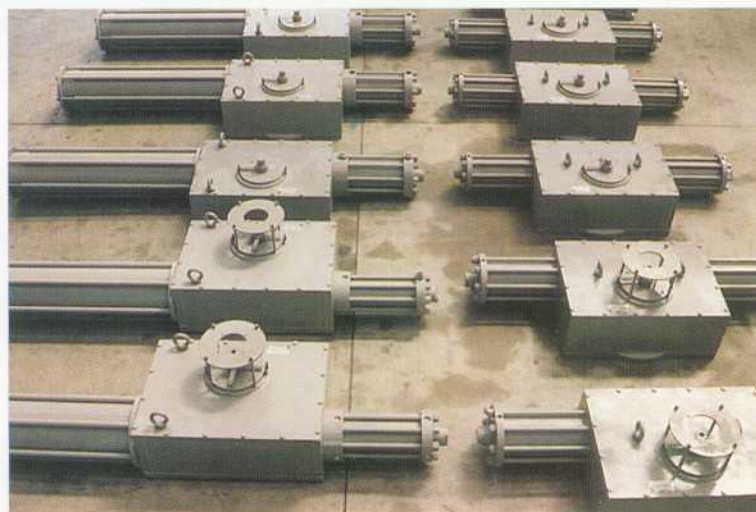
- mechanical or proximity limit switch
- modulating solenoid valve
- on-off solenoid valve
- position transmitter
- flow regulator valve
- quick discharge valve
- oil accumulator
- special hydraulic and electric equipment
- power electro-hydraulic unit



Actuator  
RHM 650/80

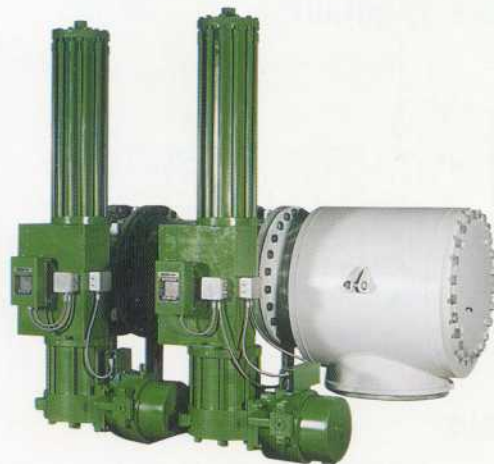


RHMS actuator during torque test (emergency stroke time 0,2 sec)

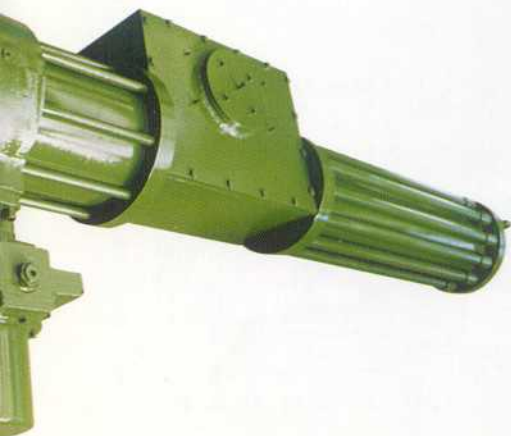




Modulating RHMS 5000/250 with quick emergency closure (stroke time 0,2 sec)



Assembling of RHM 3000/180 cup spring cartridge



## Special applications

For by-pass turbine systems or other applications in which is requested high speed of emergency action (less than 0,2 sec) with final absorber (dumping), Servovalve designs and produces full complete systems with the hydraulic and electronic equipment's supplied with RH or RHM special execution.

## Safety

The Servovalve actuators are designed to guarantee the utmost security during the installation and the work in field.

Special safety stay-bolts permits to replace the springs unloading and re-preloading themselves in field without special tools reducing completely the danger of injury to operating personnel.

## Test

RH and RHM are subjected to a continuous check during all the manufacturing process.

All the actuators are submitted to a rigorous final tests before delivery to the customer.

## Inspection and certification

All the Servovalve activity (design, production, test) is made according to the UNI EN ISO 9001 standard, checked and certified by Det Norske Veritas Institute (DNV).



## Maintenance

RH or RHM rack and pinion kinematism are lively lubricated by grease.

After a long period of working only the rubber gaskets must be replaced.

## Service

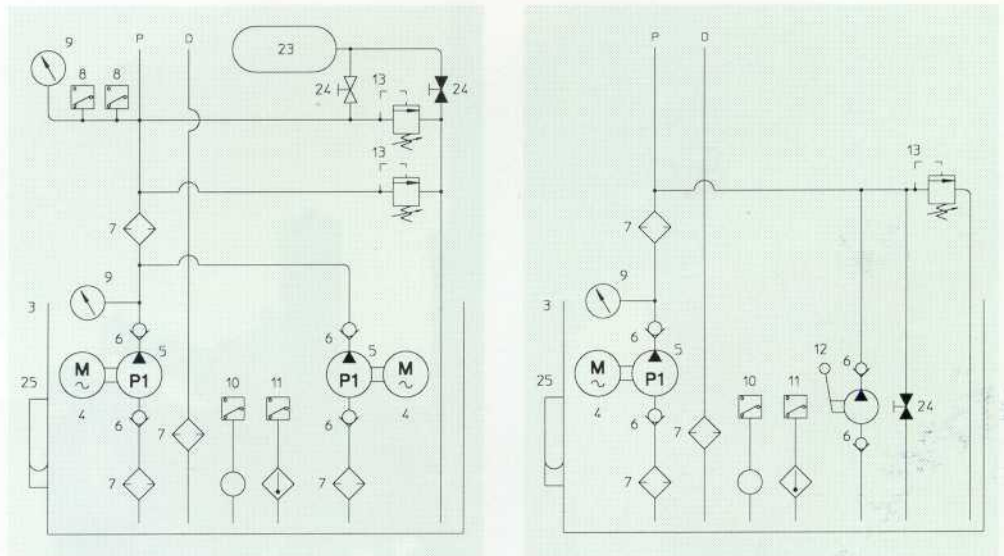
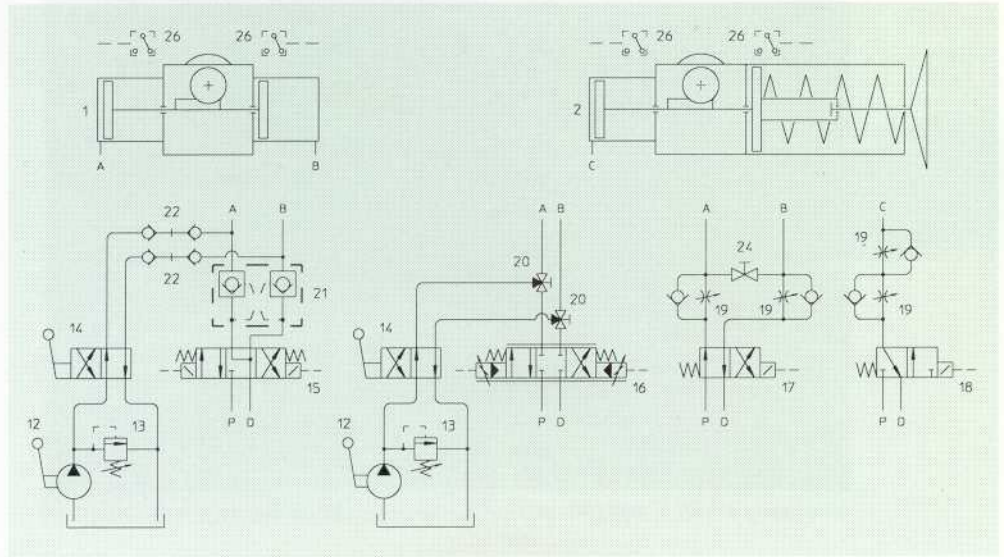
The expert Servovalve personnel guarantees prompt and fast assistance to deal with any problem during the start up and the normal working on the plant.

# TYPICAL HYDRAULIC CIRCUIT

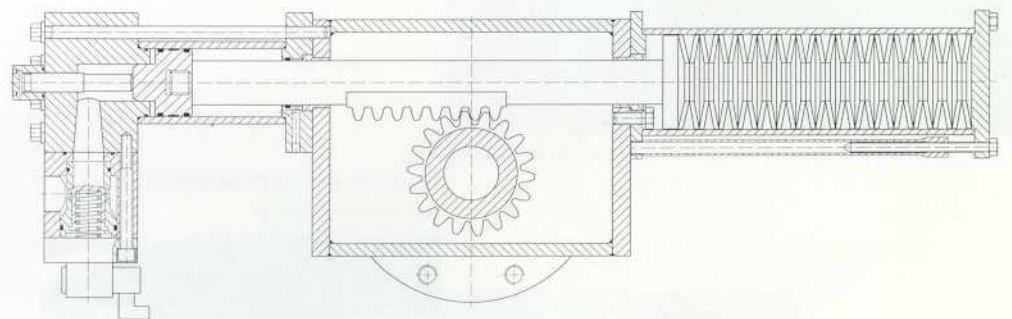
## Pneumatic equipments

- | Pos. | Description               |
|------|---------------------------|
| 1    | Actuator type RH          |
| 2    | Actuator type RHM         |
| 3    | Oil tank                  |
| 4    | Electric motor            |
| 5    | Oil pump                  |
| 6    | Non return valve          |
| 7    | Filter                    |
| 8    | Pressure switch           |
| 9    | Gauge                     |
| 10   | Level switch              |
| 11   | Thermostat                |
| 12   | Hand pump                 |
| 13   | Relief valve              |
| 14   | Manual distributor 4/2    |
| 15   | On-off solenoid valve 4/3 |
| 16   | Modulating valve 4/3      |
| 17   | On-off solenoid valve 4/2 |
| 18   | On-off solenoid valve 3/2 |
| 19   | Flow regulator            |
| 20   | Three ways manual valve   |
| 21   | Hydrolock                 |
| 22   | Quick clutch valve        |
| 23   | Accumulator               |
| 24   | Stop valve                |
| 25   | Oil level                 |
| 26   | Limit switch              |

## TYPICAL HYDRAULIC POWER UNITS AND CIRCUITS FOR RH or RHM



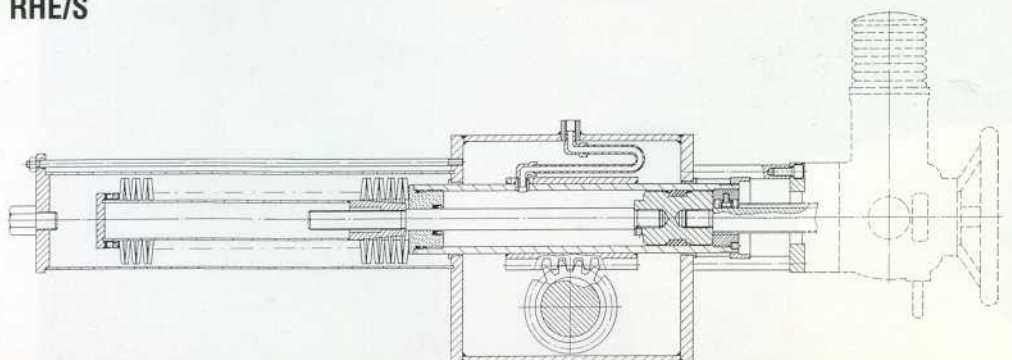
## RHM/S



### Hydraulic quarter turn actuator type RHM/S

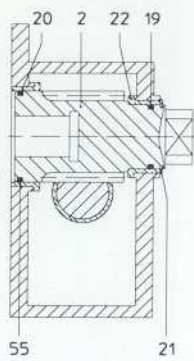
Single acting modulating actuator with emergency quick closure. Special execution with quick closing valve and shock absorber incorporated in the hydraulic cylinder head.

## RHE/S

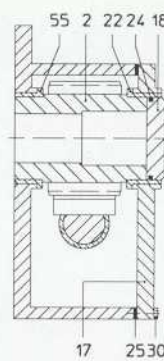


### Electro-hydraulic quarter turn actuator type RHE/S

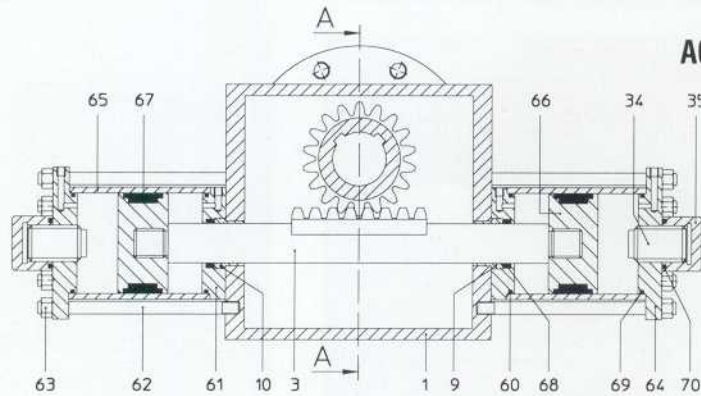
Hydraulic device for disengagement of an electric actuator in case of failure of electric power and quick closing by spring of the actuated quarter turn valve.



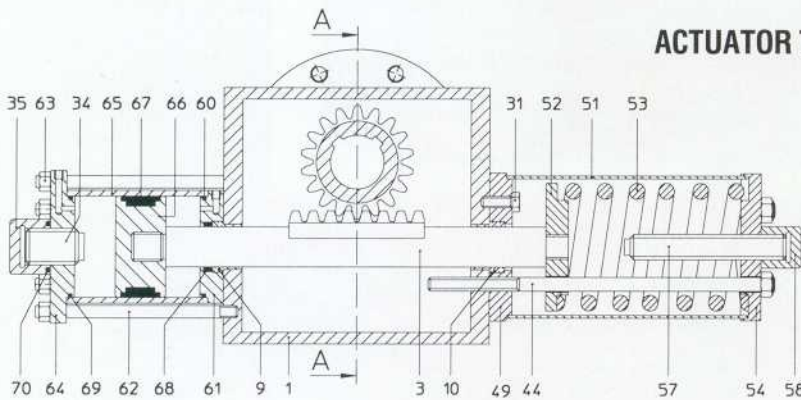
SECTION A-A  
FROM RH-RHM 15  
UP TO RH-RHM 250



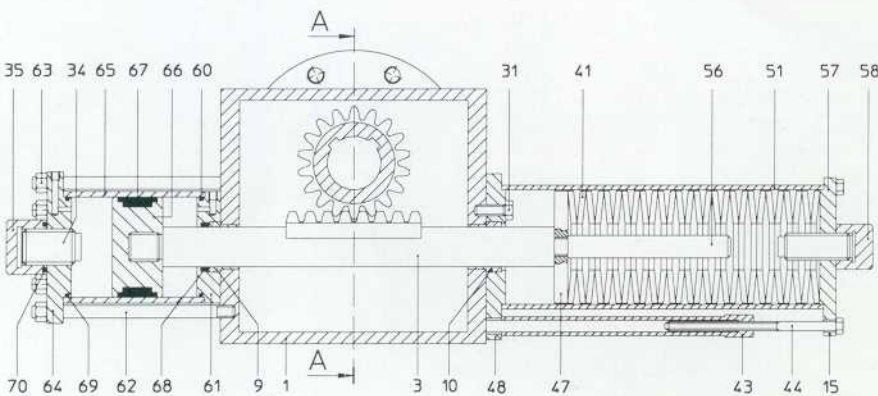
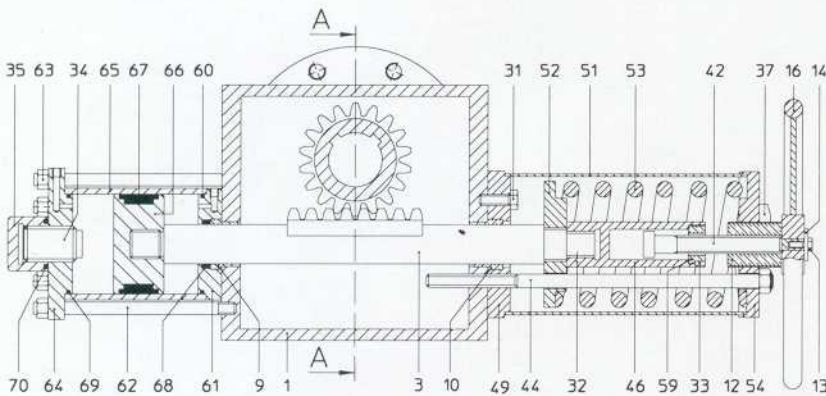
SECTION A-A  
FOR RH-RHM 650  
AND OVER



ACTUATOR TYPE RH



ACTUATOR TYPE RHM



Pos.	Description	Material
1	Housing	Spheroidal cast iron (1) Fabricated steel (2)
2	Pinion	Carbon steel
3	Rack	Chromium plated steel
9	Bushing	Bronze
10	Bushing	Bronze
12	Drive nut	Brass (1)
13	Screw	Alloy steel (1)
14	Washer	Alloy steel (1)
15	Head	Carbon steel (2)
16	Handwheel	Carbon steel (1)
17	Cover	Fabricated steel (2)
18	Index	Carbon steel (2)
19*	Gasket	N.B.R. (1)
20*	Gasket	N.B.R. (1)
21	Seeger	Alloy steel (1)
22	Bushing	Bronze
24*	Gasket	N.B.R. (2)
25*	Gasket	N.B.R. (2)
30	Screw	Alloy steel (2)
31	Screw	Alloy steel
32	Dowel	Alloy steel (1)
33	Dowel	Alloy steel (1)
34	Stop screw	Alloy steel
35	Lock screw	Alloy steel
37	Ring nut	Alloy steel (1)
41	Cup spring	Alloy steel (2)
42	Stem	Stainless steel (1)
43	Stay bolt	Carbon steel (2)
44	Safety bolt	Carbon steel
46	Device	Carbon steel (1)
47	Disc	Carbon steel (2)
48	Head	Carbon steel (2)
49	Head	Carbon steel (1)
51	Tube	Carbon steel
52	Disc	Carbon steel (1)
53	Spring	Alloy steel (1)
54	Head	Carbon steel (1)
55	Bushing	Bronze
56	Shaft	Carbon steel (2)
57	Stop screw	Alloy steel
58	Lock screw	Alloy steel
59	Ring nut	Brass (1)
60*	Gasket	N.B.R.
61	Head	Carbon steel
62	Stay bolt	Carbon steel
63	Nut	Carbon steel
64	Head	Carbon steel
65	Cylinder	Chromium or nickel plated carbon steel
66	Piston	Carbon steel
67*	Gasket	N.B.R.
68*	Gasket	N.B.R.
69*	Gasket	N.B.R.
70*	Gasket	N.B.R.

**NOTE:**

- (1) For RH-RHM 15 only  
For RH-RHM 30 only  
For RH-RHM 60 only  
For RH-RHM 250 only
- (2) For RH-RHM 650 only  
For RH-RHM 1500 only  
For RH-RHM 3000 only  
For RH-RHM 5000 only

\* Spare parts

**Maintenance**

The inner parts of the actuator are lubricated, therefore replacement of the rubber gaskets may become necessary (after a long period of work).

**Warning**

The actuator RHM contains a preload spring, so that follow carefully the installation and servicing instructions.